

## REMARKS

Applicants respectfully request reconsideration of the present application in view of the foregoing amendments and in view of the reasons that follow. Claims 1-3, 5, 6, 9, 11, 12, and 17 have been amended. Claims 4, 15, 16, and 22-24 have been canceled. Applicants respectfully submit that no new subject matter has been added to the claims. Claims 1-3, 5-14, and 17-21 are now pending in this application.

### **I. Drawings Objection**

In Section 1 of the Office Action, the Examiner objected to the drawings under 37 C.F.R. 1.83(a) stating:

The drawings must show every feature of the invention specified in the claims. Therefore, the claimed “multiple base stations” in claim 4 and “processor coupled to the radio interface” in claims 17 and 22 must be shown or the features(s) canceled from the claims(s).

Applicants have canceled Claims 4 and 22 rendering the drawing objections based on Claims 4 and 22 moot. Applicants have included a drawing sheet including a new Fig. 8. As requested by the Examiner, Fig. 8 depicts the “processor coupled to the radio interface” as recited in Claim 17. Applicants respectfully submit that no new subject matter has been added. The Specification also has been amended to include a reference to Fig. 8 and to add reference numbers as included in Fig. 8 depicting the “processor coupled to the radio interface” as recited in Claim 17. As a result, Applicants respectfully request withdrawal of the objection to the drawings.

### **II. Rejection of Claims 10 and 11 Under 35 U.S.C. § 112**

In Section 3 of the Office Action, Claims 10 and 11 were rejected under 35 U.S.C. § 112, first paragraph as failing to comply with the enablement requirement. Specifically, the Examiner stated:

The claim(s) contains subject matter which was not described in the specification in such a way as to enable one skilled in the art to which it pertains, or with which it is most nearly

connected, to make and/or use the invention. It has been claimed in claims 10 and 11 that "---the first and second radio interfaces using different category of communication link" in claim 10 and "the different categories of communications links comprising multi-carrier modulation, spread spectrum transmission, frequency division duplexing and time division duplexing" in claim 11 . However other than what is disclosed in paragraph [0031]-[0032], it is not clear how at least one of the RSs will change from one mode of operation to the other under the instruction of the BS.

(emphasis added through underlining). Applicants respectfully disagree.

First, the specification at least at paragraphs [0025], [0026], [0029]-[0032], [0034], and [0036]-[0039], describes techniques associated with "sharing resources between communication using the first radio interface and communication using the second radio interface, wherein the first radio interface and the second radio interface operate using different categories of communication links" as recited in Claim 10 "wherein the different categories of communication links comprises multi-carrier modulation, spread-spectrum transmission, frequency division duplexing, and time division duplexing" as recited in Claim 11. For example, paragraph [0034] states:

The duplexing mode described with respect to FIGS. 4 and 5 may be connected with using a dynamic reuse technique. Reuse means dividing some orthogonal resources (time, frequency, codes) between each cell or subcell in such a way that the interference coming from neighboring cells is reduced. The cells/subcells are divided into fixed number of groups (e.g. reuse factor) so that the distance between cell belonging to one group is maximized, an each group is assigned one part of the orthogonal resources. For example, if the reuse is done in time with reuse factor three, at first instant the cells/subcells in group one are active, at time instant two the second group is active and at time instant three the third group. The reuse can be made dynamic, so that it is possible to assign more orthogonal resources to one group than the others, and that the assignment may be changed when required.

Applicants respectfully submit that the extensive discussion related to dynamic reuse, scheduling, coding, modulation, multiple access methods, etc. enables one skilled in the art to make and/or to use the techniques recited in Claims 10 and 11.

Second, the Examiner states that “it is not clear how at least one of the RSs will change from one mode of operation to the other under the instruction of the BS.” However, neither Claim 10 nor Claim 11 includes any such requirement. Thus, no enablement related to this capability is required. As a result, Applicants respectfully request withdrawal of the rejection of Claims 10 and 11 under 35 U.S.C. § 112, first paragraph.

**III. Rejection of Claims 1-3, 6, and 8 Under 35 U.S.C. § 102(e)**

In Section 5 of the Office Action, Claims 1-3, 6, and 8 were rejected under 35 U.S.C. § 102(e) as being anticipated by U.S. Patent Publication No. 2003/0165127 to Fujiwara et al. (Fujiwara). Applicants respectfully traverse the rejection because Fujiwara fails to teach, suggest, or disclose all of the elements of Claims 1-3, 6, and 8.

Independent Claim 1, as amended, recites in part:

multiplexing the communication between the first relay station and a base station and between the first relay station and a second relay station using a first radio interface to create a plurality of simultaneous data streams;

Fujiwara states:

FIG. 5 is a diagram showing a transmission path when the relay stations 2 transmit pilot signals. As shown in FIG. 5, for example, when the relay station 2A receives the pilot signal, there are a transmission path in which the pilot signal is transmitted directly from the relay station 2A to the destination station 3 and a transmission path in which the pilot signal is transmitted from the relay station 2 to the destination station 3 as going through the other relay station 2B or 2C. It is also similar to the above when the relay station 2B or 2C receives the pilot signal from the source station 1.

(Para. [0048]). Fujiwara also states that “[t]here are a transmission path in which the signal is transmitted from the destination station 3 to any of the relay stations 2 and a transmission path in which the signal is transmitted directly to the source station 1 from the destination station 3.” (Para. [0068]). However, Fujiwara fails to teach, suggest, or disclose at least “multiplexing the communication between the first relay station and a base station and

between the first relay station and a second relay station using a first radio interface to create a plurality of simultaneous data streams” as recited in Claim 1. An anticipation rejection cannot properly be maintained where the reference used in the rejection does not disclose all of the recited claim elements. Claims 2, 3, 6, and 8 depend from Claim 1. Therefore, Applicants respectfully request withdrawal of the rejection of Claims 1-3, 6, and 8.

**IV. Rejection of Claims 4, 5, 7, and 9 Under 35 U.S.C. § 103(a)**

In Section 8 of the Office Action, Claims 4, 5, 7, and 9 were rejected under 35 U.S.C. 103(a) as being unpatentable over Fujiwara in view of U.S. Patent No. 7,218,891 to Periyalwar et al. (Periyalwar). Applicants have canceled Claim 4 rendering its rejection moot. Applicants respectfully traverse the rejection of Claims 5, 7, and 9 because Fujiwara and Periyalwar, alone and in combination, fail to teach, suggest, or disclose all of the elements of at least Claim 1, as amended. Claims 4, 5, 7, and 9 depend from Claim 1.

As discussed in Section III., Fujiwara fails to teach at least “multiplexing the communication between the first relay station and a base station and between the first relay station and a second relay station using a first radio interface to create a plurality of simultaneous data streams” as recited in Claim 1. Periyalwar states:

Within FIG. 6 as illustrated, the intelligent relay includes transmitter and receiver circuitry for both directions. However, the complexity of the BS and the UE elements remain relatively unchanged. While the control functionality to operate the base station and terminal in the time division mode should be added, the hardware complexity of BS and UE element is not increased. It should be noted that this is in sharp contrast to prior art relaying such as through "peer-relaying" where each and every terminal needs to have the capability to deliver data traffic from other terminals as well as from the BS.

(Col. 5, lines 34-44). Periyalwar further states:

On the uplink, shown on the right hand side of FIG. 9, the same benefit would be applicable from the stable channel condition between one or more BS 92, 93 and the intelligent relay 94, and the short distance between the UE 98 and intelligent relay (shown as a single antenna UE only for illustration). In

addition, the concept of virtual MIMO for the uplink can be applied to exploit further advantage of the intelligent relaying. In the FIG. 9, the relay may transmit to 2 BSs, to each in 2x2 mode, and with the help of a high speed link between the BS' the incoming signals may be processed collectively to yield effectively a virtual 2x4 MIMO channel. In such instance, intelligent relay 94 would effectively have 2 transmit antennas 94a toward the BSs 92, 93, and two transmit antennas 94b toward the UE 98.

(Col. 10, lines 33-46). Thus, Periyalar describes a relay station communicating with a plurality of base stations and with a user equipment. Periyalar, however, fails to teach, suggest, or disclose at least “multiplexing the communication between the first relay station and a base station and between the first relay station and a second relay station using a first radio interface to create a plurality of simultaneous data streams” as recited in Claim 1 with emphasis added through underlining. An obviousness rejection cannot be properly maintained where the references used in the rejection do not disclose all of the recited claim elements. Therefore, Applicants respectfully request withdrawal of the rejection of Claims 5, 7, and 9.

**V. Rejection of Claims 10 and 11 Under 35 U.S.C. § 103(a)**

In Section 10 of the Office Action, Claims 10 and 11 were rejected under 35 U.S.C. 103(a) as being unpatentable over Fujiwara in view of U.S. Patent Publication No. 2004/0131025 to Dohler et al. (Dohler). Applicants respectfully traverse the rejection because Fujiwara and Dohler, alone and in combination, fail to teach, suggest, or disclose all of the elements of at least Claim 1, as amended. Claims 10 and 11 depend from Claim 1.

As discussed in Section III., Fujiwara fails to teach at least “multiplexing the communication between the first relay station and a base station and between the first relay station and a second relay station using a first radio interface to create a plurality of simultaneous data streams” as recited in Claim 1. Dohler states:

Another more recent technique that has achieved an increase in capacity utilises multiple-input multiple-output transmission techniques (MIMO) in which a multi antenna transmitter sends data to a multi-element receiver. The signal at each receive antenna is different due to the effects of multipath as described

above, from which the original signal can be re-assembled. Coding and sending the signal spaced in time has been found to be particularly beneficial in achieving increased capacity in MIMO channels. Thus space, time and coding are used to enhance system capacity which is known as "space-time coding". As the name suggests space-time encoding involves splitting the signal and transmitting it over a number of antennae that are spatially separate and by sending the signal from each antenna at a different time.

(Para. [0016]). Dohler further states:

According to the invention there is provided a system for transmitting and receiving signals in which there is at least one transmitter (TX) comprised of at least one antenna element, which sends out signals to a group of MTs each of which is comprised of at least one antenna element. Each MT within this group receives at least part of all signals, if necessary extracts its own dedicated signal and, after possible processing, relays the signals dedicated to the other MTs within the group or to MTs of other groups. The process of relaying can be accomplished by retransmission through a wireless or wired interface.

In use, the TX appropriately encodes the signals for the MTs in dependency of channel state information (CSI) available and prevailing complexity issues, and transmits it via the air interface to the appropriate group(s) of MTs. In a preferred, although not restricted to, embodiment of the invention two operational modes are possible. First, signals are relayed within one group only. In this case, each MT within such group can be considered to act as a relaying receiver (r-RX) and thus as a virtual receiver for at least one other target MT (t-MT) within the same group. Second, signals are relayed from one group to another group of MTs. In this case, MTs of one group can be considered to act as a relaying transmitter (r-TX) and thus as a virtual transmitter for at least one other t-MT within another group. A MT acting either as r-RX or r-TX is termed relaying MT (r-MT). For either case the relaying is accomplished by using either the same air interface as from the TX to the MTs or a different interface, which could be wireless or wired.

(Para. [0175]-[0176]). Thus, Dohler describes a plurality of mobile terminals which relay signals. Dohler, however, fails to teach, suggest, or disclose at least "multiplexing the communication between the first relay station and a base station and between the first relay

station and a second relay station using a first radio interface to create a plurality of simultaneous data streams” as recited in Claim 1. An obviousness rejection cannot be properly maintained where the references used in the rejection do not disclose all of the recited claim elements. Therefore, Applicants respectfully request withdrawal of the rejection of Claims 10 and 11.

**VI. Rejection of Claims 12-16 Under 35 U.S.C. § 103(a)**

In Section 12 of the Office Action, Claims 12-16 were rejected under 35 U.S.C. 103(a) as being unpatentable over Fujiwara. Applicants have canceled Claims 15 and 16 rendering their rejection moot. Applicants respectfully traverse the rejection of Claims 12-14 because Fujiwara fails to teach, suggest, or disclose all of the elements of at least Claim 12, as amended. Claims 13 and 14 depend from Claim 12.

Independent Claim 12, as amended, recites in part:

a first relay station having a second radio transceiver and being configured to simultaneously communicate with the base station and with a second relay station using a first radio interface

As discussed in Section III., Fujiwara fails to teach at least “multiplexing the communication between the first relay station and a base station and between the first relay station and a second relay station using a first radio interface to create a plurality of simultaneous data streams” as recited in Claim 1. Similarly, Fujiwara fails to teach at least “a first relay station having a second radio transceiver and being configured to simultaneously communicate with the base station and with a second relay station using a first radio interface” as recited in Claim 12. An obviousness rejection cannot be properly maintained where the reference used in the rejection does not disclose all of the recited claim elements. Therefore, Applicants respectfully request withdrawal of the rejection of Claims 12-14.

**VII. Rejection of Claims 17-19 and 22-24 Under 35 U.S.C. § 102(e)**

In Section 14 of the Office Action, Claims 17-19 and 22-24 were rejected under 35 U.S.C. § 102(e) as being anticipated by Periyalar. Applicants have canceled Claims 22-24

rendering their rejection moot. Applicants respectfully traverse the rejection of Claims 17-19 because Periyalwar fails to teach, suggest, or disclose all of the elements of at least Claim 17. Claims 18 and 19 depend from Claim 17.

Independent Claim 17, as amended, recites in part:

a radio interface that simultaneously communicates with a base station and with a second relay station using a first radio interface;

As discussed in Section IV., Periyalwar fails to teach at least “multiplexing the communication between the first relay station and a base station and between the first relay station and a second relay station using a first radio interface to create a plurality of simultaneous data streams” as recited in Claim 1. Similarly, Periyalwar fails to teach at least “a radio interface that simultaneously communicates with a base station and with a second relay station using a first radio interface” as recited in Claim 17. An anticipation rejection cannot be properly maintained where the reference used in the rejection does not disclose all of the recited claim elements. Therefore, Applicants respectfully request withdrawal of the rejection of Claims 17-19.

**VIII. Rejection of Claim 20 Under 35 U.S.C. § 103(a)**

In Section 16 of the Office Action, Claim 20 was rejected under 35 U.S.C. 103(a) as being unpatentable over Periyalwar in view of Fujiwara. Applicants respectfully traverse the rejection because Periyalwar and Fujiwara, alone and in combination, fail to teach, suggest, or disclose all of the elements of at least Claim 17, as amended. Claim 20 depends from Claim 17.

As discussed in Section VII., Periyalwar fails to teach at least “a radio interface that simultaneously communicates with a base station and with a second relay station using a first radio interface” as recited in Claim 17. As discussed in Section III., Fujiwara fails to teach at least “multiplexing the communication between the first relay station and a base station and between the first relay station and a second relay station using a first radio interface to create a plurality of simultaneous data streams” as recited in Claim 1. Similarly, Fujiwara fails to



teach at least "a radio interface that simultaneously communicates with a base station and with a second relay station using a first radio interface" as recited in Claim 17. An obviousness rejection cannot be properly maintained where the references used in the rejection do not disclose all of the recited claim elements. Therefore, Applicants respectfully request withdrawal of the rejection of Claim 20.

Applicants believe that the present application is in condition for allowance. Favorable reconsideration of the application as amended is respectfully requested.

The Examiner is invited to contact the undersigned by telephone if it is felt that a telephone interview would advance the prosecution of the present application.

The Commissioner is hereby authorized to charge any additional fees which may be required regarding this application under 37 C.F.R. §§ 1.16-1.17, or credit any overpayment, to Deposit Account No. 19-0741. Should no proper payment be enclosed herewith, as by a check or credit card payment form being in the wrong amount, unsigned, post-dated, otherwise improper or informal or even entirely missing, the Commissioner is authorized to charge the unpaid amount to Deposit Account No. 19-0741. If any extensions of time are needed for timely acceptance of papers submitted herewith, Applicant hereby petitions for such extension under 37 C.F.R. §1.136 and authorizes payment of any such extensions fees to Deposit Account No. 19-0741.

Respectfully submitted,

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